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Mode d'emploi

Micro-Osmometer

Type 15 AUTOMATIC

E15-TI 1/2005

Operating instructions

Löser Messtechnik

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Operating instructions

Automatic Micro-Osmometer Type 15

1. General

Definition of peltier-effect

When an electric current flows across the junction between two different metals or semiconductors a quantity of heat proportional to the total electric charge crossing the junction is evolved or absorbed depending on the direction of the current. This effect is due to the existence of an electromotive force at the junction and is named after Jean Peltier (1785 - 1845).

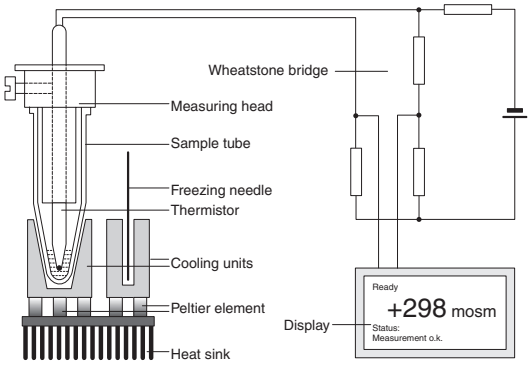
Peltier cooling

By using Peltier elements small amounts of liquid can be cooled and frozen. Peltier-elements become warm on one and cool on the other side.The cold side is in thermal contact with a metal block, which contains two apertures: one for the sample tube and another for the freezing needle.

The warm side is mounted onto a cooling surface. The necessary air cooling is provided by a fan. The Peltier element is charged with a current from a regulated power supply. This is controlled by a thermistor in order to keep the temperature of the metal block constant.

2. Measuring principle

The freezing point of aqueous solutions is measured. The freezing point depression in comparison to pure water is a direct measure of the osmotic concentration. Pure water freezes at 0° C; an aqueous solution with an osmolality of 1 osmol/kg H_2O freezes at –1.858° C.

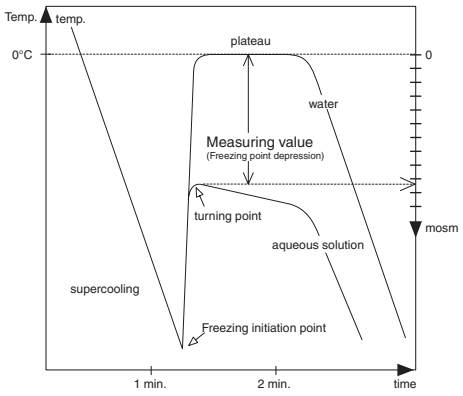


The sample tube containing the sample is placed onto the measuring head, which inserts a thermistor into the sample. The thermistor is part of a Wheatstone bridge.

Two or three values are stored electronically: One for the freezing point of distilled water and another one or two for standard solutions. Based on these values a microprocessor calculates all further measuring values. They are displayed with necessary information on the text display.

The sample starts off at room temperature. Using a pipette it is put into a sample tube, which is placed onto the measuring head. This will be slid down on its guide rods inserting the sample tube into the cone shaped cooling aperture. Now the sample begins to be cooled. The display will show decreasing values. Once zero is reached, increasing negative values will be displayed.

In clean sample tubes aqueous solutions are easily supercooled, i. e. the sample does not freeze, although the freezing point has been passed. At a defined supercooling (when the display shows –6.2) a cooled needle with ice crystals is inserted automatically into the sample to initiate the freezing. The temperature will begin to rise until the freezing point is reached. The point of inflection thus achieved is the value.



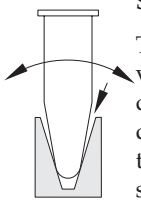
Typical cooling curves of water and aqueous solutions

Pure water produces a prolonged plateau, whereas solutions have a turning point of only a few seconds duration. The approach to the plateau or the turning point will be indicated and automatically recognized. The final value will be stored and a buzzer gives a short tone. The display now shows the result, and print it if a printer (option) is connected. The last 100 measurements are stored in the memory. Later output on display, printer or PC interface is possible.

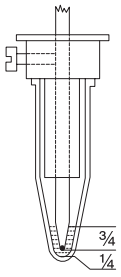
Because of the linear correlation between osmolality and freezing point, the measurement values are displayed in milliosmol/kg H_2O (mosm) and not °C.

3. Operation

100 µl-sample tubes: We recommend Sarstedt reagent tubes, which we use when adjusting the thermistor before delivering the Osmometer. **(Order-No. Sarstedt: 72.690)**.



The instrument is adjusted at the factory for a sample volume of 100 µl, and the tip of the thermistor has a distance of 2 mm to the bottom of the sample tube. If different sample tubes are used, the position of the thermistor must be checked and readjusted if necessary.



We strongly advise against the use of asymmetric sample tubes or such fitting only loosely into the cooling aperture. This causes poor reproducibility of measurements.

The instrument must be calibrated prior to commencing measurements. **Measurement and calibration must always be carried out using the same thermistor positions and the same sample volumes!**

The Osmometer is fitted with a clear text display**.** The advice and messages explain the operation. Please follow them. For calling the Osmometer-menu (Page 13) push the «**M**enu»-key (5). Mark with ↑and ↓ -keys (item is inverted) and select with the «**E**nter» key (5). If you want to go a step backwards push the «Menu» key.

4. Calibration

Calibration with distilled water (Zero)

Switch power on and wait for ready display (about three minutes).

1. Fill sample tube with 100 µl distilled water (volume must be ±10%).
2. Attach sample tube (4) to measuring head (6).
3. Depress measuring head so that sample tube enters cooling aperture.
4. **E**nter sample number with keyboard (2) or codereader (option).
5. Supercooling is reached in about 1 minute. At –6.2 the freezing needle (11) is automatically taken out of the cooling aperture and inserted into the sample for about one second, then it is returned to its original position. Display: «Sample freezing».
6. Changing values while approaching the freezing plateau are displayed. When the buzzer sounds and the display shows «Measurement completed», the value for water is determined and stored in the memory. Additionally the measuring value with number, date and time is given out at the RS 232 interface and printer (option). Raise the measuring head. If the display does not show «0 mosm» enter the menu «Calibration» and select «Calibration 0». The «Enter» key must be pressed to set the zero value. The message «calibration o.k.» is displayed and in the memory the sample number changes to «Cal 0». So the calibration is comprehensible later. Additionally the calibration with number, date and time is given out at the RS 232 interface and printer. If a standard solution was used inadvertently, the message «Please measure with water» will be displayed.
7. Remove sample tube carefully. Remaining ice on the thermistor must be removed **with care** by means of sample tube.
8. **Important:** Sample residues on the thermistor will falsify next measurement! For that reason wipe thermistor each time with a soft tissue.

Calibration with standard 300 mosm

1. Fill sample tube with 100 µl (±10 %) of 300 mosm standard.
2. **to 5**. Same steps as calibration zero (see above)

6. Changing values while freezing are displayed. When the buzzer sounds and the display shows «Measurement completed», the value for 300 mosm is determined and stored in the memory. Additionally the measuring value with number, date and time is given out at RS 232 interface and printer (option).

   Raise the measuring head.

   If the display does not show «300 mosm» enter the menu «Calibration» and select «Calibration 300». The «Enter» key must be pressed to set the 300 mosm value. The message «calibration o.k.» is displayed and in the memory the sample number changes to «Cal 300». So the calibration is comprehensible later. Additional the calibration with number, date and time is given out at RS 232 interface and printer.

   If water or 900 mosm solution was used inadvertently, the message «Please measure with 300 mosm!» will be displayed. Fresh samples should be used for each measurement.

7. **and 8.** as page 3

Calibration with standard 900 mosm

1. **to 8.** Same steps as calibration with standard 300 mosm.

9. «Cal 900» appears in the display , now the measurements will be done with 3-point calibration.

The calibration with 900 mosm is only practical, if the expected values are above 600 mosm. This calibration point gives more exact measurements for higher concentrated solutions. If all samples are in the range of about 300 mosm the 900 mosm calibration is unnecessary. Select «Deactivate 'Cal 900'» from the calibration menu and press «Enter». A buzzer sounds and «Cal 900» disappears from the display. Now the measurements will be done with 2-point calibration.

General information for calibration

Every calibration point consists of the average of max. 10 calibrations since switching on the osmometer. To display, select the corresponding item in the menu. After switching off the osmometer the calibration memory is erased, only the averages remain in the memory for further measurements. If a new average is requested i.e. in case of miscalibration, the calibration memory is manually erasable by selecting the item in the menu.

The calibration is stable for a considerable time. In general use contamination of the thermistor may cause the zero or standard calibration point to vary. Before recalibrating the thermistor must be cleaned.

A difference of +1 or –1 mosm from the nominal value is tolerable. Should the difference be considerable, repeat the measurement with a **fresh sample filled into a new sample tube.** Recalibration may not be necessary.

Some examples are listed below (in general sense also for 900 mosm)

Measurement	H_2O	300 mosm
1. Sample	*0005*	*0305*
2. Sample	*0002*	*0301*
3. Sample	*0000*	*0300*

Result:
Thermistor was dirty with sample residues. Zero adjustment was correct. A recalibration with the first sample would be a mistake.

Measurement	H_2O	300 mosm
1. Sample	*0005*	*0305*
2. Sample	*0005*	*0306*
3. Sample	*0005*	*0304*

Result:
In this case a recalibration is necessary.

It is recommendable to use a NaCl solution (0.9%, 286 ±3 mosm) as a control for plausibility.

5. Measurement

The measurements will be done in the same steps as described under calibration (item 4). Use a fresh sample for every measurement filled into a new sample tube. If it is necessary to measure the same sample a second time it must be stirred after thawing to avoid concentration gradients. It may be advisable to measure a new pipetted sample.

In case of dust in the sample tube or if the same tube is used often and/or not correct cleaned the sample freezes before reaching the initiation point of –6.2°C. The message «Freezing too early» appears in the display.

High concentrated samples or those difficult to freeze may cause a delayed freezing. Then the osmometer repeats the needle movement up to three times. If no crystallization starts the osmometer displays the message «freezing the sample is impossible!». By lifting the measuring head the osmometer goes back to the status «Ready».

The automatic thawing function avoids icing of the sample cooling aperture. When it is very humid after prolonged use it is possible that a drop of pure thawing water comes out of the drain under the Osmometer which can be easy wiped off.

Storing measuring values

The last 100 measurements are stored in the memory which can be displayed by selecting the item in the menu. The output of the last 10, 20, 50 or 100 measuring values with sample number, date and time to the connected printer DR 15 and the RS 232-interface is also possible. The newest value appears in first position.

6. Special advices

Blocking the needle with frozen water is prevented under normal conditions by the automatic thawing function. The thawing water from the needle cooling aperture is automatically sucked off and collected in the waste bottle.

Note: This waste may contain infectious residues of samples. Dispose expertly! In the case case of very high humidity the needle can become blocked. Manual thawing is recommendable, selectable by menu. A beep indicates the end of thawing.

The menu lso allows the cleaning of the needle aperture. Select the corresponding item of the «Service» menu. To fill in the cleaning fluid **only use the soft plastic-funnel** delivered with the osmometer to prevent any damage of the needle aperture.

Never use force or sharp or pointed tools. For cleanig fluid use only water perhaps with a small amount of washing up liquid. A buzzertone indicates the end of cleaning. Depending on the number of measurements a daily cleaning is recommended, necessary cleaning is at least one time a week.

7. Configuration of the osmometer

Language

Several languages are selectable in the «Language» menu.

System

Several settings are possible with the «System» menu. Select the corresponding item and follow the messages.

1. Date and time setting
2. Configure RS 232 interface
3. Configure printer interface
4. Configure codereader (scanner) interface
5. Codereader activate/deactivate

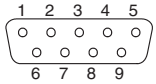
Interfaces

The osmometer has serial interfaces which are in accordance to the American standard EIA RS 232 C. This and the German standard DIN 66020 describe the electrical properties. Voltage ±15 Volt maximum. Signal voltage between –3 Volt and +3 Volt is not permitted, because the logical level is defined as follows:

"Mark" Logical '1' for the voltage from –3 V to –12 V.
"Space" Logical '0' for the voltage from +3 V to +12 V.

For connection of the codereader, the printer or a personal computer only use the cables delivered with the osmometer. The connectors are on the rear panel of the osmometer.

Pin connection of 9 pin D-SUB male plug for printer and RS 232 interface:



pin	abbr.	in/out	function
1	DCD	O	Data carrier detected (connected to pin 4 and pin 6)
2	RXD	I	Receive data
3	TXD	O	Transmit data
4	DTR	O	Data terminal ready (connected to pin 6)
5	SG	-	Signal ground
6	DSR	I	Data set ready (connected to pin 4)
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	RI	-	Ring indicator (no connection)

Pin connection of 9 pin D-SUB male plug for codereader (scanner):

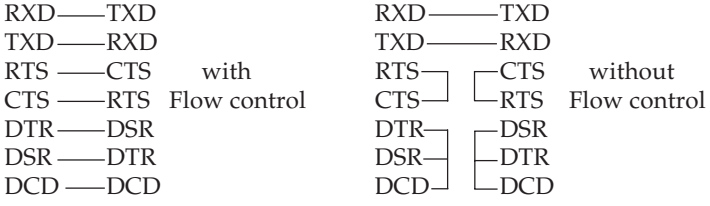
pin	abbr.	in/out	function
1	-	O	+5 V power supply for codereader
2	RXD	I	Receive data
3	TXD	O	Transmit data
4	DTR	O	Data terminal ready (connected to pin 6)
5	SG	-	Signal ground
6	DSR	I	Data set ready (connected to pin 4)
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	-	O	+5 V (connected to pin 1)

Observe the same settings at the Osmometer and the connected equipment.

Parameters: Baudrate selectable, 8 data bits, parity selectable, 1 stop bit. Flow control selectable. Definition of XON/XOFF: XON = 11h/XOFF = 13h (ASCII-charakters)

For the **printer DR 15** are valid 9600 baud, no parity, Flow control XOn-XOff. If another printer is connected the corresponding settings are necessary. For the **scanner SC 15** are valid 9600 baud, no parity, no flow control.

Osmometer interface to printer, computer or codereader



The interfaces are only for dataflow from Osmometer to printer, computer or codereader. For using with printer it is useful to connect the flow control lines like described above. For using with a personal computer it is possible to run without flow control.

The RS 232 data are ANSI, the printer data are ASCII, both with CR/LF for every printing line and an EOT sign for end of transmission.

8. Data transmitting to a personal computer

To receive data with a personal computer from the RS 232 interface of the osmometer connect it with the delivered nullmodem cabel to a free serial port (COM1 ... COM4) of the PC.

Then install the delivered terminal program Com15V10. To do so start the file "Setup.exe" from the delivered data carrier out of the windows explorer and follow the on screen instructions. The setup program creates on the specified drive a directory "Com15V10" containing the program files.

Now start the file "Com15V10.exe" out of the windows explorer. The terminal program checks all COM ports. Select the desired port by pressing "F3". The selected port appears down in the status line of the window. Select "F1" for advices to use the program or help.

Important: The received data is stored as a text file (*.txt) and an excel file (*.xls). The next start of the terminal program **overwrites these files**! Please **copy or move these files** if you still need them!

Please use always the nullmodem cable delivered with the osmometer. If transmitting is impossible, first check the cable and the settings of PC-operating sytem and osmometer.

System requirements:
Free COM port, MS-Windows 3.1 or above and MS-DOS 5.0 or above.

9. Printer DR15

Type: DPN-2333-Microprinter, Manufacturer Datamega. Please read and follow the enclosed user manual (german/english) carefully.

For transmitting data from the osmometer to the printer use the enclosed cable DKA-205. If another power supply is necessary observe carefully the correct polarity and electrical values that are mentioned in the user manual. Otherwise the operation is incorrect or printer may be damaged.

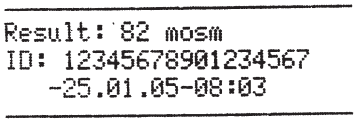
When switching on the osmometer with the printer an introduction is printed and indicates the correct function.

If transmitting to printer DR 15 is impossible, first check the cable and the settings of the osmometer (see page 7).

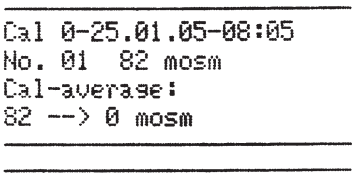
Printing example

The introduction is printed after switching on and indicates the correct function of the printer.

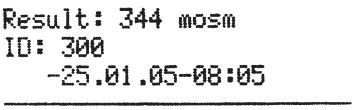
The measuring result will be printed with identification (ID)-number, date and time of measuring.



A calibration (in example "CAL 0") will be printed with date, time, number and the average of calibration.



The measuring result will be printed with identification (ID)-number, date and time of measuring.



Changing of ribbon cassette

Please follow the instructions in the printer user manual. Order number of ribbon cassette: Epson ERC-22 or ERC-09

Loading paper

Please follow the instructions in the printer user manual. Outlines of paper roll: Diameter 30 ... 80 mm, width 57.5 mm, thickness 0.07 mm

Cleaning

Clean the housing with a soft tissue moistened with a little bit of water.

10. Codereader (Scanner) SC15:

Type: FBC-3860-FuzzyScan, manufacturer Cino Group. Please follow the instructions in the scanner user manual carefully.

For transmitting data from the codereader to the osmometer use the enclosed cable.

The power supply of the Scanner is provided by the osmometer via the interface D-sub plug with 5VDC, 0,5A maximum. The connection of pins is described on page 7.

When switching on the osmometer with the scanner a beep from the scanner indicates the correct function.

If transmitting from scanner SC 15 is impossible or incorrect, first check the cable and the settings of the osmometer (see page 7).

Configuration of codereader

The scanner recognises the most current types of barcodes automatically while scanning. The interface parameters are presetted in the factory.

If a new scanner of the same type is connected or the settings are lost, so read the opposite barcodes in the numerous order to restore the factory settings.

1 "Factory Default Setting"

2 RS 232 "Quick Set Command"

3 "Program"

4 "Record Suffix"

5 "6" for EOT (04h)

6 "End" (Exit)

Cleaning

Clean the housing with a soft tissue moistened with a little bit of water.

11. Thermistor replacement

Switch off the osmometer and wait for the display to go out.

The thermistor is provided with a suitable precision resistor and a mini plug. Access can be gained to the mini connectors inside the measuring head to which the thermistor is connected by removing the black measuring head cover (6). The thermistor must be fixed in the measuring head in the right position with the plastic screw. The distance of 2 mm to the bottom of the sample tube should be adjusted exactly. (see also page 2).

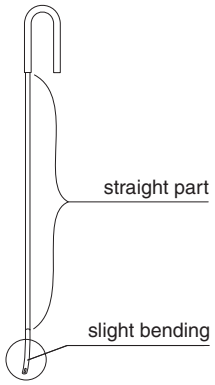
Subsequently a new calibration with distilled water and then one with 300 mosm standard and if selected with 900 mosm standard is required. (See pages 3 and 4.)

Every osmometer is supplied with one spare thermistor.

12. Exchange of the freezing needle

Only the original freezing needles should be used. The Osmometer is supplied with a spare freezing needle.

1. Switch off the osmometer and wait for the display to go out.
2. Put an empty sample tube (4) at the measuring head (6).
3. Push the measuring head down.
4. Remove the old needle (11) by loosing the handscrew (9).
5. Put a new needle into the needle hole of the measuring head.
6. Lift the right slider (7) by hand and shift the needle lever (8) to the measuring head.
7. Insert the needle shaft into the slit under the fixing nut and fix it with the handscrew (9).
8. Put back the needle into its cooling aperture. Attention: The needle must go down slightly to its lowest position in the cooling aperture as well as in the sample tube. Possibly an adjusting is needed.



13. Maintenance

Maintenance should be carried out **only by qualified personnel.** The Osmometer does not require fixed maintenance intervals.

14. Technical details, security

Power supply, protective class, spare fuses

Power supply: AC 50/60 cps. For supply voltage see label on the rear panel of the osmometer.

Power consumption: Operating: about 45 VA, standby about 25 VA

This equipment is according to **protective class I** and requires connection to **protective earth** for safety reasons!

Spare fuses: Use only fuses in accordance with IEC 127. The Osmometer is delivered with two spare fuses T 400 mA (100/115 Volts: T 630 mA) and two spare fuses T 6.3 A which are fixed at the inner side of the rear panel. Access can be gained by removing the yellow cover.

The instrument must be disconnected from the supply mains before the cover is removed. Turn off lateral screws, lift the cover upwards.

The osmometer is **CE-marked.**

Clock battery

The lifetime of the inserted lithium-battery CR 2032 is more than 5 years. If time and date are lost after switching off the osmometer the battery is empty. To replace it switch off the osmometer and wait for the display to go out. Then turn off the lateral screws, lift the cover upwards and replace battery. Afterwards execute a date and time setting.

Usage

Only for **indoor use,** please keep dry. Use only by following these operation instructions.

Location: Only on a hard base (table), no sunshine, keep away from radiators. Keep the rear blow out of the fan and the bottom holes clear.

Operating temperature: 0° C to +35° C, maximum 80% relative humidity.
Storage temperature: –20° C to +65° C.

Measuring range

Measuring range: 0 ... 2500 mosm. All higher concentrated samples must be diluted. **Reproducibility** for solutions with low viscosity: ±0,5% (in case of 50 µl sample volume: ±1%)

Laboratory instructions, cleaning

Observe laboratory instructions for handling infectious body fluids.

Clean the instrument by wiping off with a soft tissue moistened with a little bit of water with disinfectant. It is prohibited to use sprays for cleaning.

The **thermistor** has to be dried with a soft tissue immediately after removing the sample tube. Sample residues in the **needle groove** must be cleaned from time to time.

It is recommended to clean the **needle cooling aperture** daily or weekly depending on the number of measurements. For details see page 6.

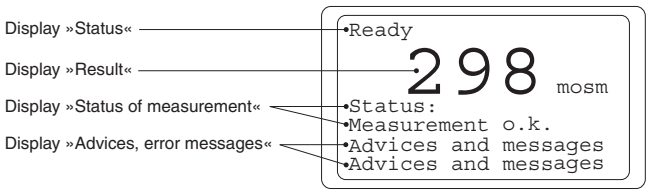
15. Explanation, recycling

Special **explanation** to the operating personnel is not necessary because of the clear text display. We recommend the observing of this operating instructions.

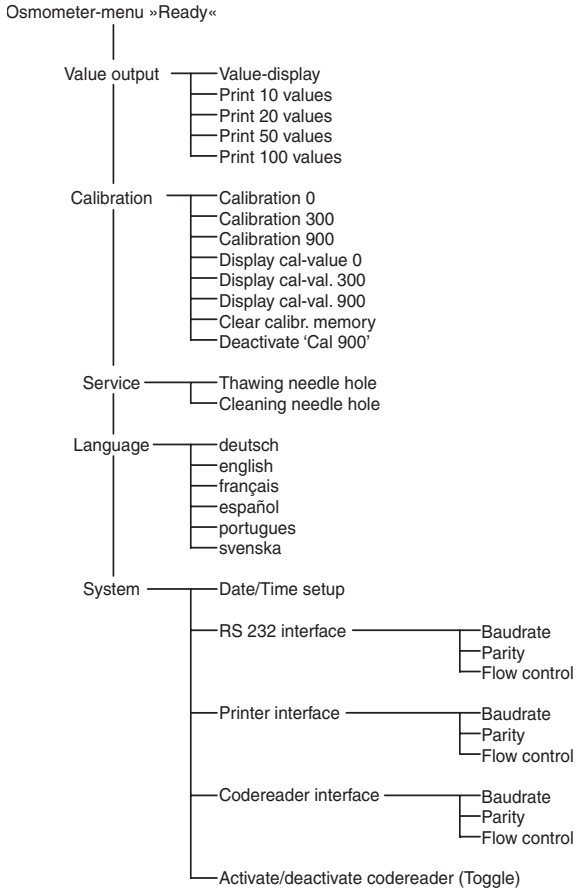
The **recycling of an old Osmometer** should only be carried out by a recycling company.

Rev. January, 31st, 2005

16. Clear text display



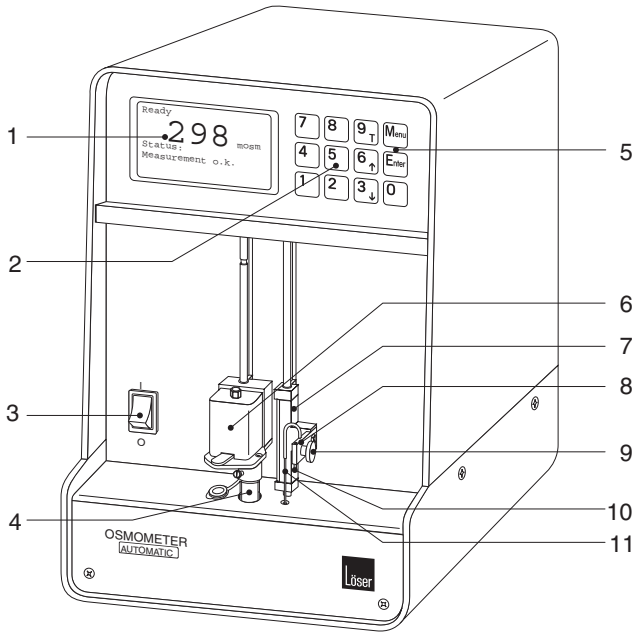
17. Menu-structure



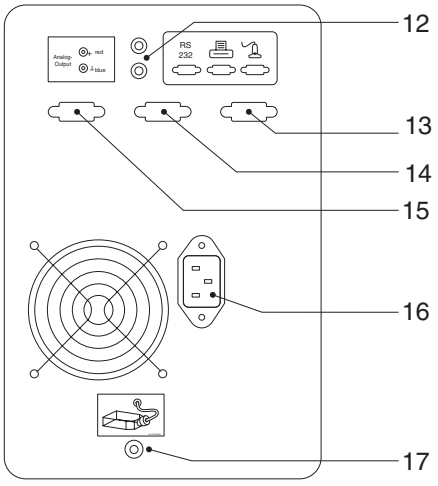
18. Troubleshooting

Message	possible reason	Solution
Thermistor error! Switch off and check the thermistor.	Thermistor short-circuit Bridge faulty	Replace thermistor Contact your local service
Thermistor cut! Switch off and check the thermistor.	Thermistor broken Bridge faulty	Replace thermistor Contact your local service
Error in the reference Switch off and contact your local service.	Bridge faulty	Contact your local service
Error with the needle drive! Switch off and contact your local service.	Motor control faulty	Contact your local service
Error … Needle movement is blocked.	Neddle blocked Motor does not run Motor control faulty	Correct manually Contact your local service Contact your local service
Codereader error!	Codereader activated, but not connected ... ... or faulty	Check cable or connection Contact your local service
Terminal or printer not ready. Output will be terminated!	Faulty cable ... … or not connected Wrong parameters Wrong cabel used (see chapter 7)	Change cable, check connection Correct it Use correct cable
Error ... Undercooling is too slow!	Room temperature too high or unit placed in the sun Peltier-element faulty Unfitting sample tube	Place instrument in a cool and shady place Contact your local service Use recommended ones
Error ... freezing the sample is impossible!	Sample too concentrated Sample not able to freeze Peltier-element faulty	Dilute sample Measurement impossible Contact your local service
Error ... freezing too early!	Dust in the sample tube Old or rough sample tube Thermistor scratched	Use new sample tube Use new sample tube Change thermistor
Error ... No value within the search time!	There is no exact freezing point reached within the search time	i.e. centrifuge sample and separate solid parts

19. Operating elements, connectors



1. Display:
   «Osmometer ready»
2. Keyboard
3. Power switch
4. Sample tube
5. Keys
   «Menu» and «Enter»
6. Measuring head (-cover)
7. Needleslider, right
8. Lever for freezing needle
9. Freezing needle
   fixing screw
10. Needle stop
11. Freezing needle
12. Analogue-output
    (option)
13. Codereader socket
14. Printer socket
15. RS 232 socket
16. CEE-mains plug
17. Hose connection
    to waste bottle



20. EU-Conformity

EU Declaration of Conformity

Manufacturer:

Axel Löser Meßtechnik
13589 Berlin, Rauchstraße 2

Identification of the product (name, type, variant):

Osmometer Type 15

The product identified above complies with the requirements of the following EEC directives:

Richtlinie 98/79/EG des europäischen Parlamentes
und des Rates vom 27. Oktober 1998
über In-Vitro-Diagnostika

Proven by meeting the following European harmonised Standards:

EN 61326-1:März 2002
(Elektrische Betriebsmittel für Leittechnik und
Laboreinsatz - EMV-Anforderungen)

EN 61000-4-2:2001
EN 61000-4-3:2003
EN 61000-4-4:2002
EN 61000-4-5:2001
EN 61000-4-6:2001
EN 61000-4-7:2003
EN 61000-4-8:2001
EN 61000-4-11:2001

Attaching of CE-Mark: 2005

Location, Date: Berlin, den 7. Januar 2005

Signature:

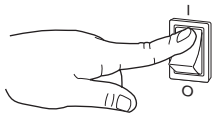
A. Löser

Micro-Osmometer

Type 15 AUTOMATIC

Short-form Operating instructions

1.



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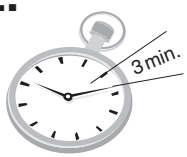

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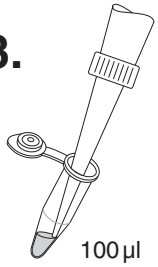

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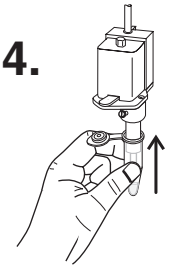

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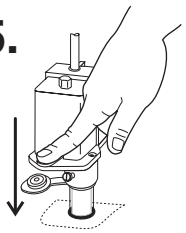

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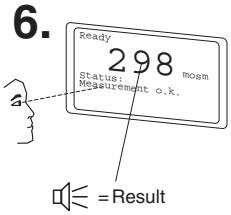

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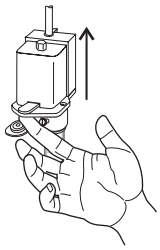

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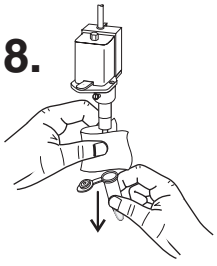

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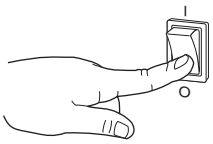
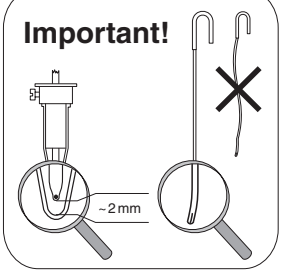


Important!



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E15-KG 1/2005